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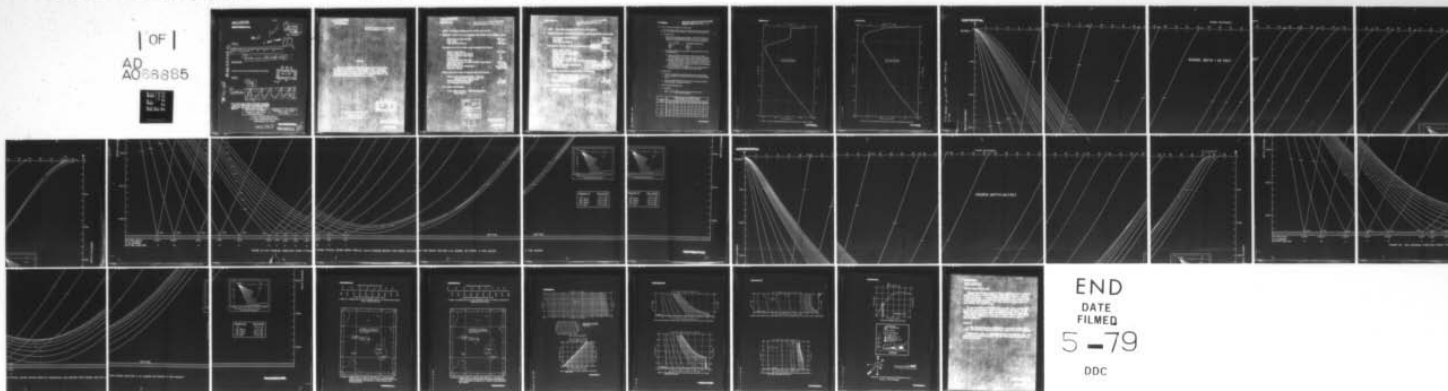
NAVAL OCEANOGRAPHIC OFFICE WASHINGTON D C MARINE SC--ETC F/G 8/10  
OCEANOGRAPHY FOR LONG RANGE SONAR IN ATLANTIC AREA A FOR AUGUST--ETC(U)  
AUG 63

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1 OF 1  
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REPORT

NO. 0-116-63

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3. MOST Protect 2

TITLE

OCEANOGRAPHY FOR LONG RANGE SONAR IN ATLANTIC  
AREA A FOR AUGUST,                            

AUTHOR

OCEANOGRAPHIC DEVELOPMENT DIVISION

DATE

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100

A close-up photograph of a rough, granular surface. A handwritten arrow points from the bottom right towards the top left. The word "DENT" is written vertically in capital letters along the arrow's path.



\_\_\_\_\_

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- ## II. PREDICTED VALUES FOR CLADORANGE FOR AUGUST (GULF STREAM WATER)

**WYOMING**

21

**Abstract**

SECRET OF DEFENSE (R) 40

**THE**

**I**



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**[REDACTED]**

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100

12-hour hours of work • 100% absenteeism

[illegible]

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THESE TWO TANKS FOR DISPOSING OF ABOUT 5,000 GALLONS OF SEA WATER

**THE**

A high-contrast, black and white photograph of a rough, textured surface, possibly a wall or concrete. The image is characterized by a grainy, mottled appearance with various shades of gray and black. A dark, irregular shape, which appears to be a shadow or a hole, is visible in the center-left area. The overall texture is uneven and rugged.

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### III USE OF GRAPHS FOR PARTICULAR CONDITIONS

1. From BT temperature trace, determine and tabulate sound speed at sonar depth ( $V_1$ ) and at layer depth ( $V_2$ ) from Figure 5. Tabulate bottom ( $V_3$ ) from Figure 4.

2. Convergence zone

- a. Determine if convergence zone is possible. The difference between the bottom speed ( $V_3$ ) and speed at sonar depth ( $V_1$ ) will give a qualitative indication of convergence zone existence according to the table below.

$V_3 - V_1$ (ft/sec)	Convergence Zone Existence
Negative	None
0-30	Borderline
>30	Strong

- b. To determine angular width and midpoint of totally refracted rays usable in convergence zone:

- (1) Determine minimum angle for totally refracted ray from Figure 6 using sound speed at sonar depth ( $V_1$ ) and sound speed at layer depth ( $V_2$ ) (first vertexing speed). With no layer, the minimum angle is  $0^\circ$ .
- (2) Determine maximum angle for totally refracted ray from Figure 6 using sound speed at sonar depth and bottom sound speed ( $V_3$ ) (second vertexing speed) from Figure 4. (Bottom sound speed may also be obtained from sound speed profile in Figure 1).
- (3) Best tilt (D/E) angle for convergence zone will be that equipment tilt nearest the average of the minimum and maximum angles.

3. Bottom Bounce

- a. Refracted ray angle (to the nearest degree) tangent to the bottom [Item 2 b (2), above] plus  $3^\circ$  determines the minimum useful bottom bounce Ray angle.
- b. Use the equipment tilt (D/E) angle nearest to the minimum useful bottom bounce Ray angle as computed in Item III 3 a.

4. Near surface path detection range

- a. Use Table 1.

TABLE 1 MEAN SURFACE PATH DETECTION RANGE (KYDS)  
OF A SHALLOW TARGET

LAYER DEPTH (FEET)	FIGURE OF MERIT PLUS TARGET STRENGTH (ALLOWABLE TWO-WAY LOSS IN DB)										
	170	175	180	185	190	195	200	205	210	215	220
0	3	3	4	4	5	5	6	7	8	8	9
50	7	8	10	11	12	14	15	17	19	20	22
100	10	11	13	16	17	19	22	24	26	29	31
400	13	17	19	23	27	30	34	38	41	45	49

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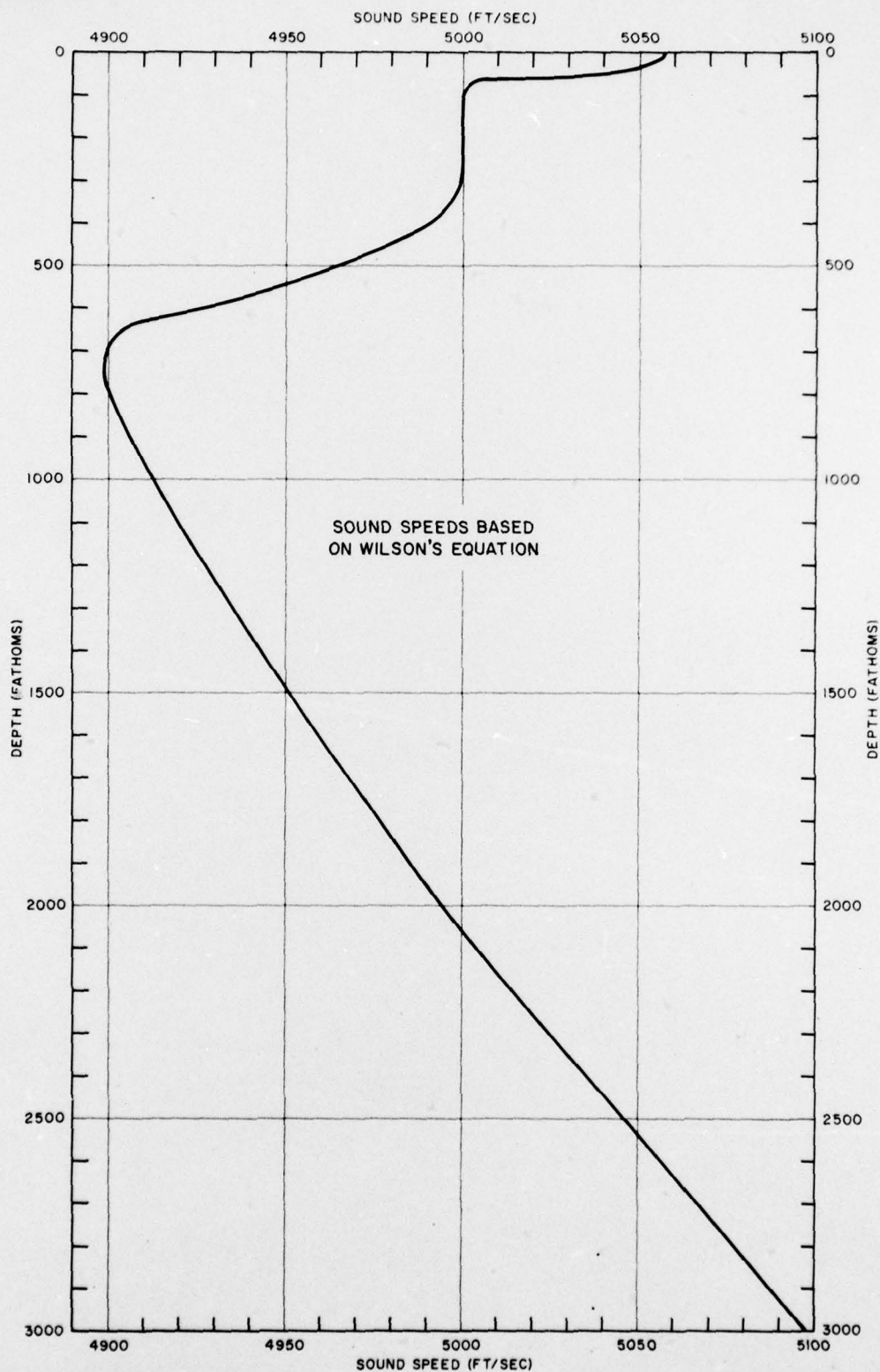


FIGURE 1A 'TYPICAL SOUND SPEED PROFILE FOR AUGUST (GULF STREAM WATER)

AREA A AUGUST 0-116-63

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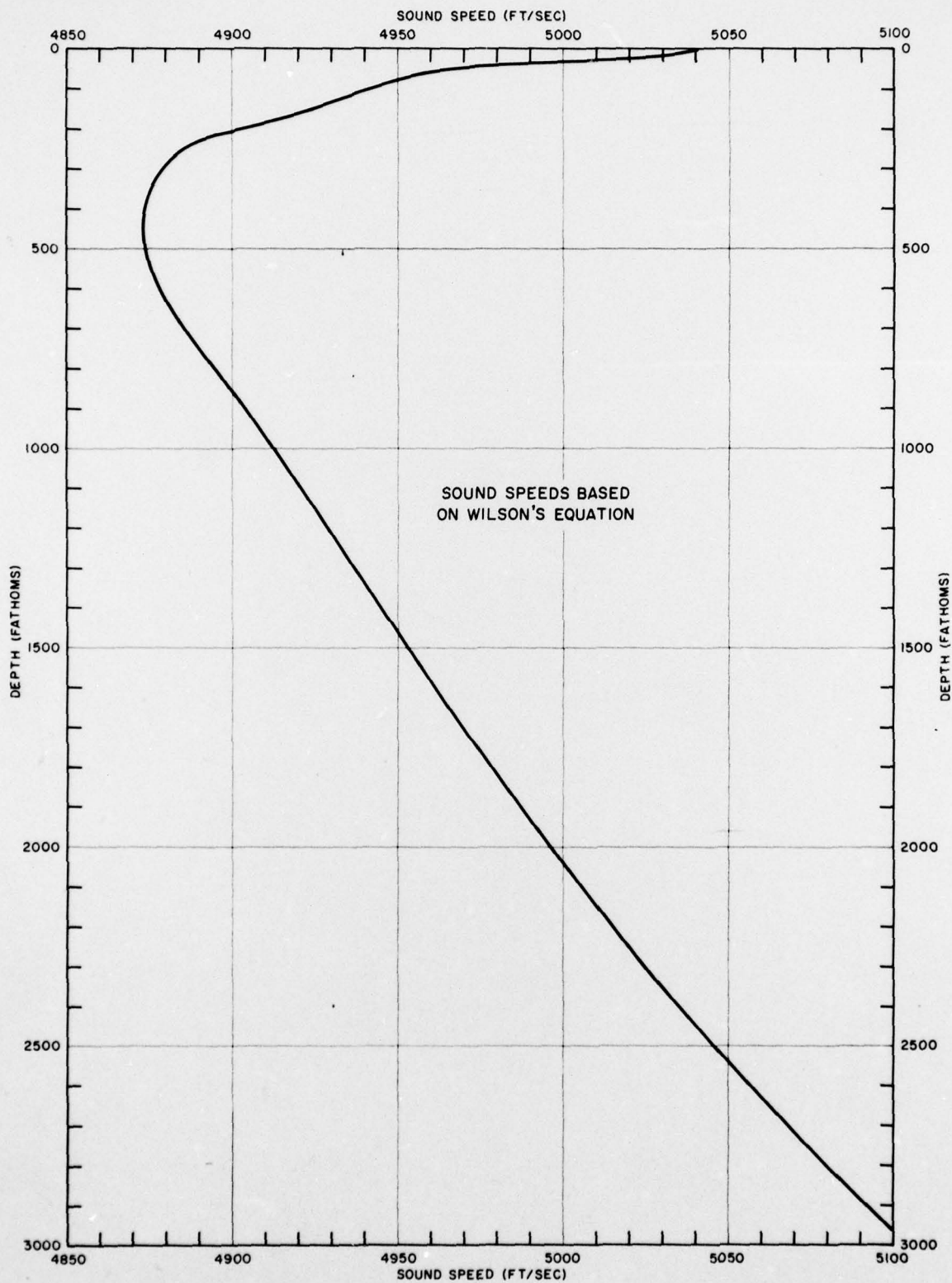


FIGURE 1B TYPICAL SOUND SPEED PROFILE FOR AUGUST (SARGASSO SEA WATER)

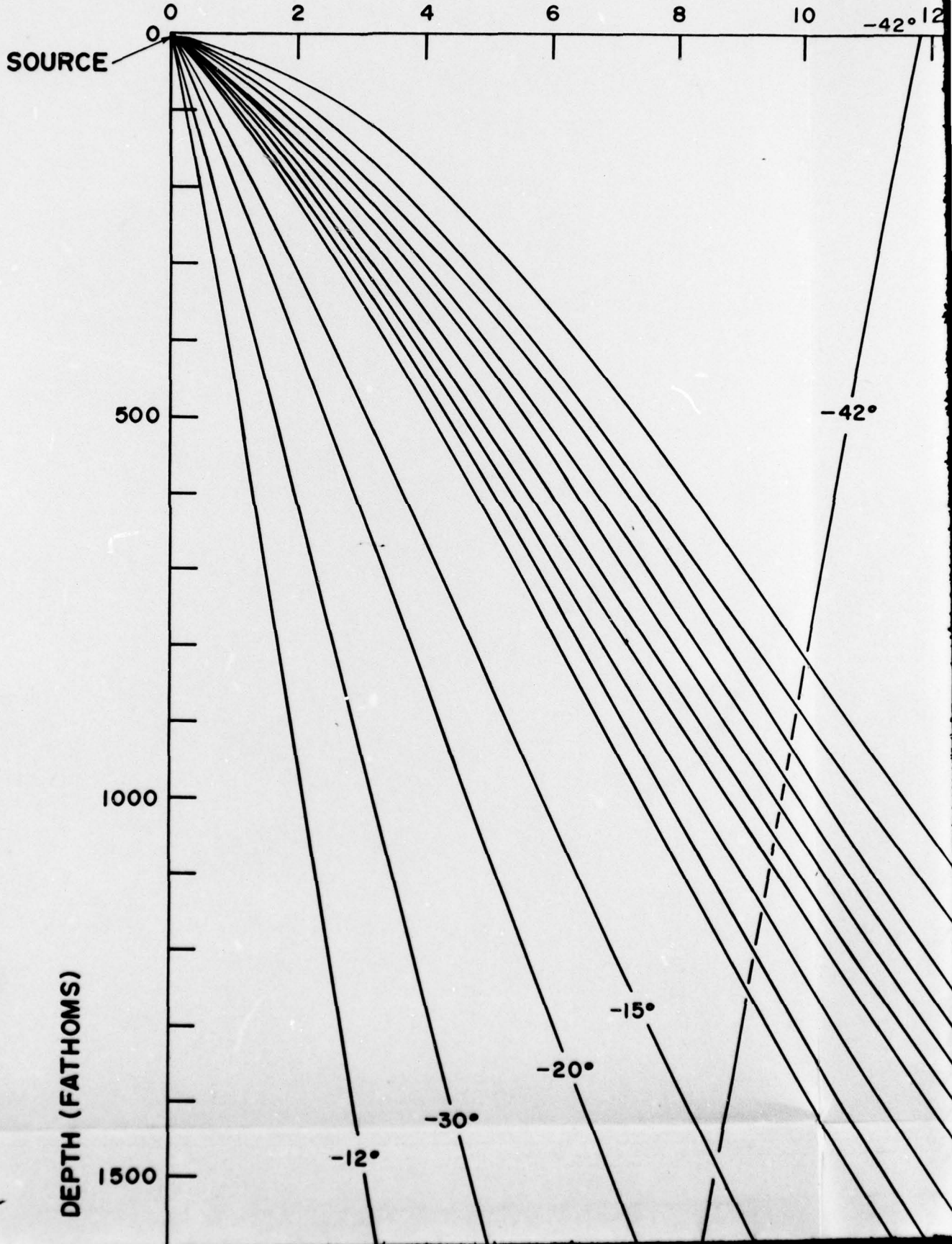
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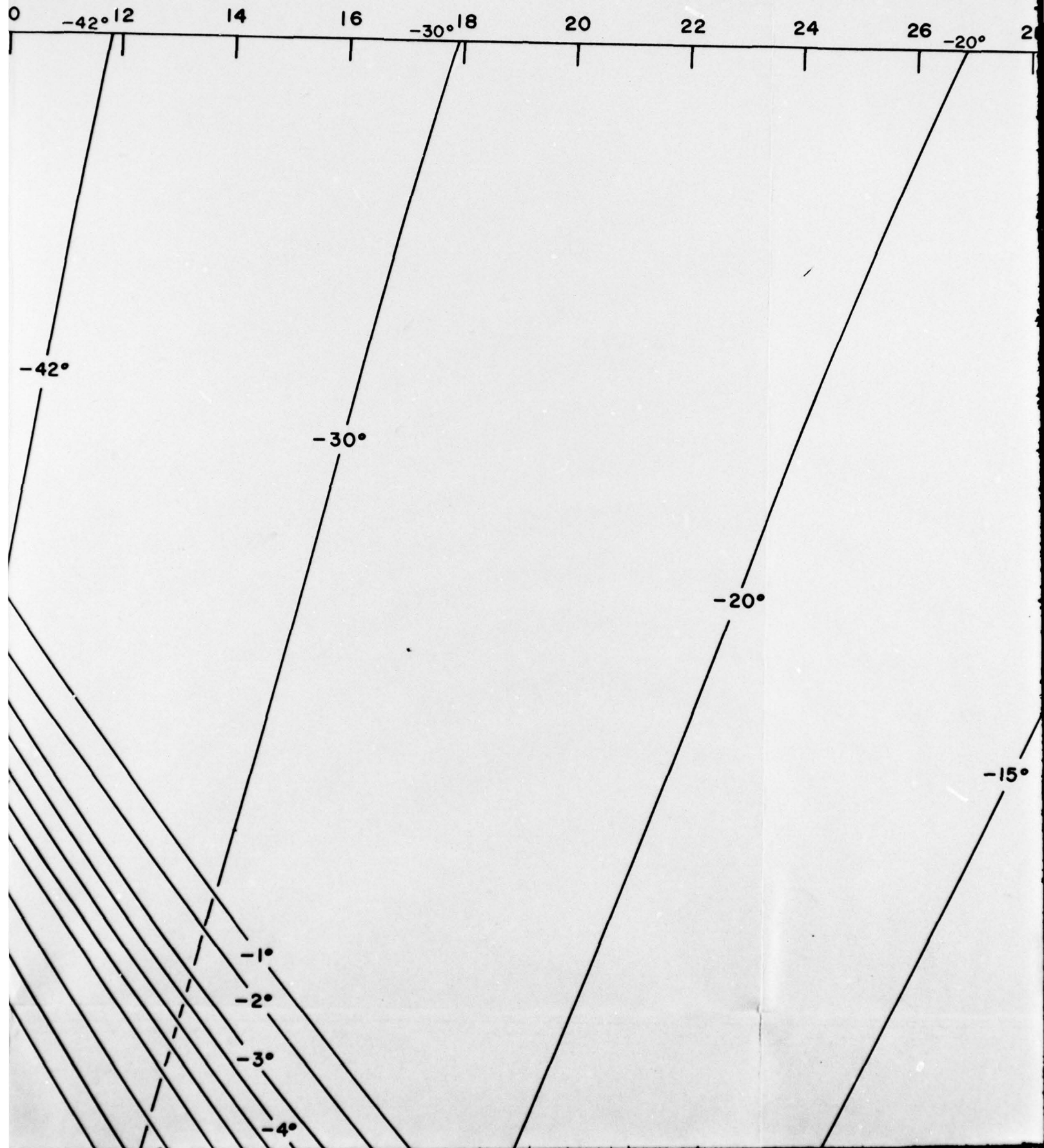
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A



A. H. AUGUST 0-116-63 A-AUG FIG 2A  
6-63

2





3

RANGE (KILOYARDS)

26 -20° 28 30 32 34 -15° 36 38 40 42

SOURCE DEPTH = 25 FEET

-15°

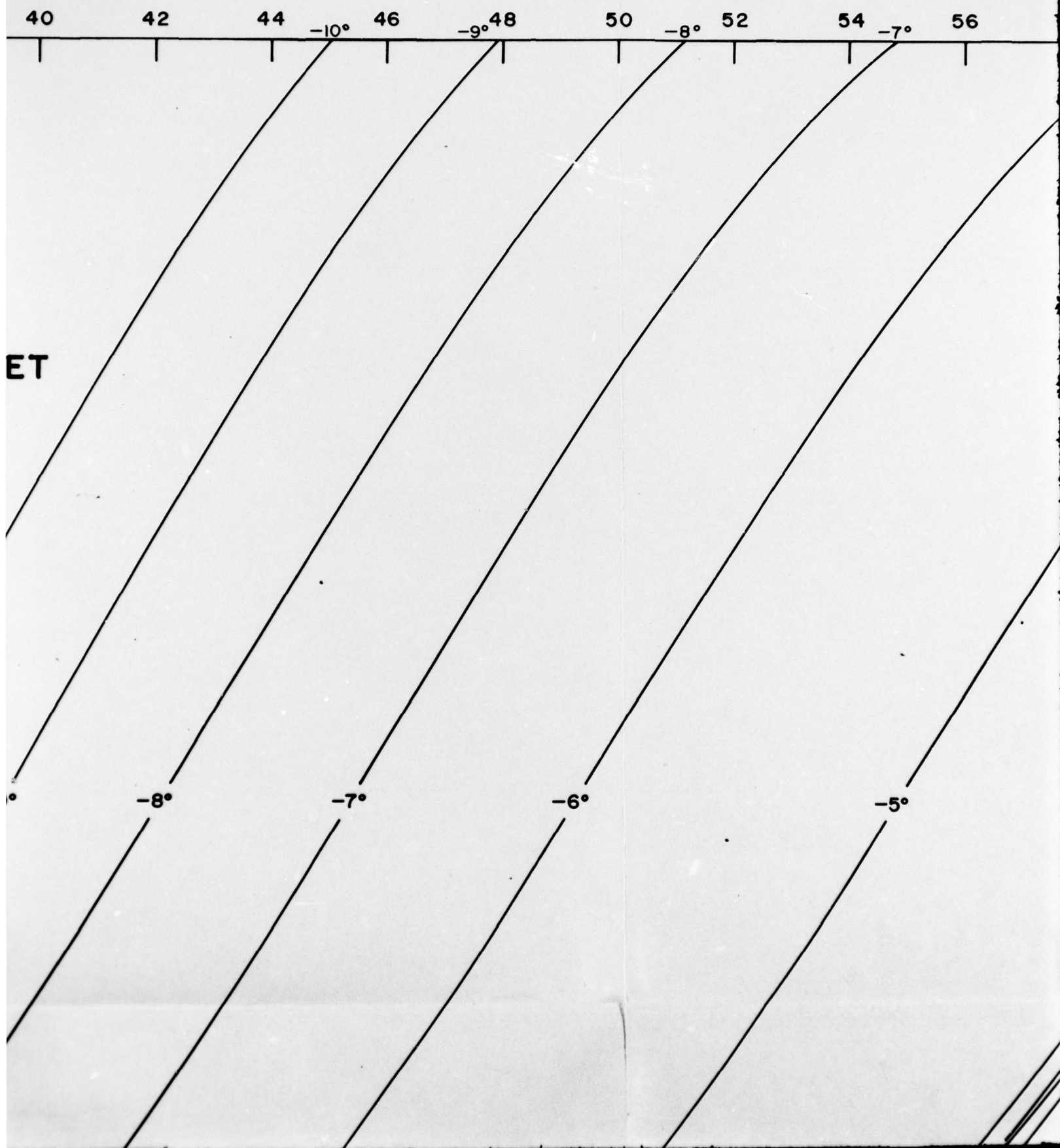
-10°

-9°

-8°

47

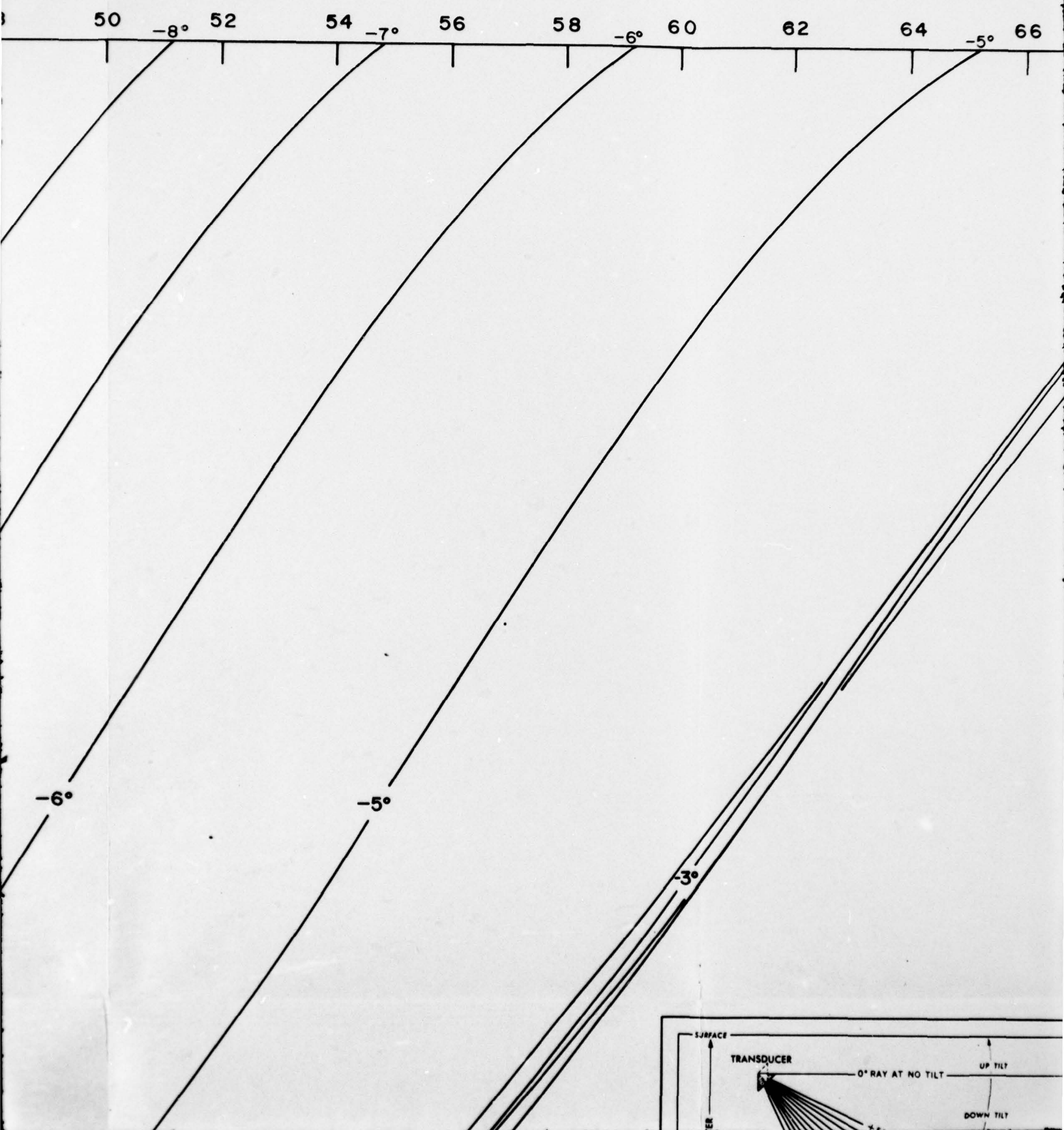
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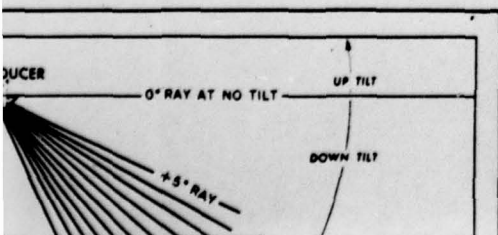
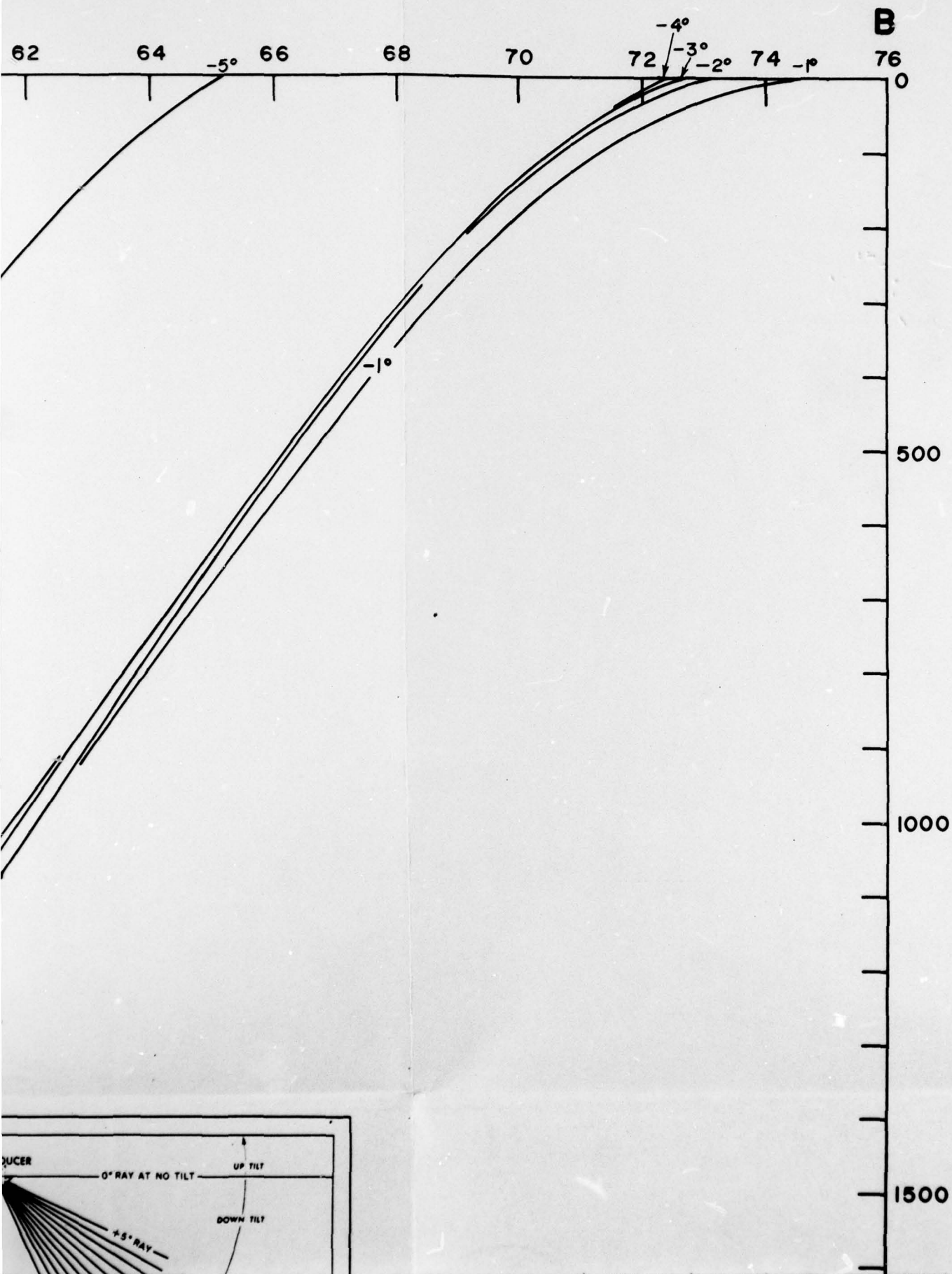


ET



5





DEPTH (FATHOMS)

1500

2000

2500

-20°

-30°

-12°

-1°

-2°

-3°

-42°

-30°

-20°

BOTTOM ANGLE

2-KC NOMINAL

BOTTOM LOSS (db)

+41.8°

+29.7°

+19.5°

17

16

12

7



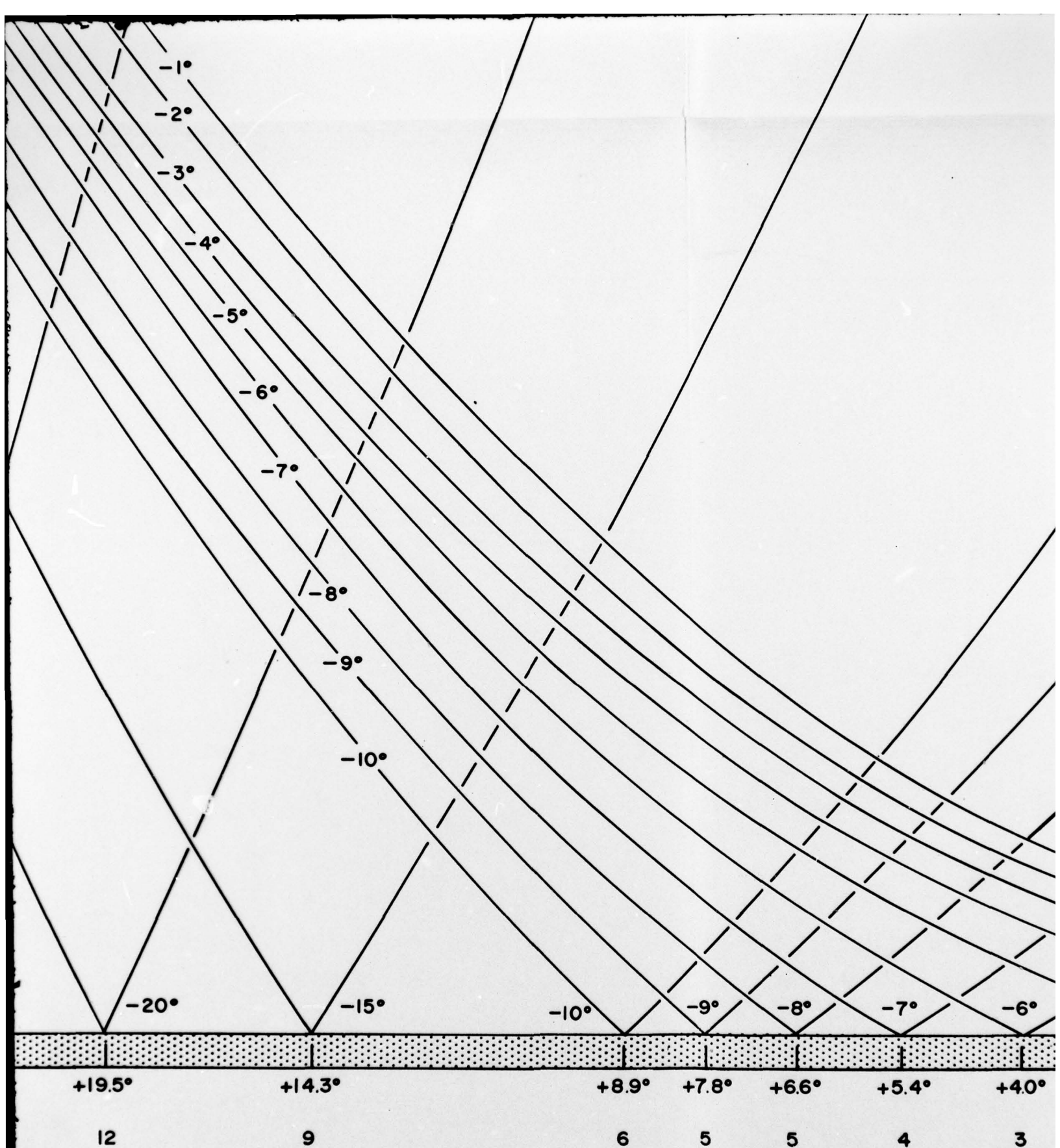
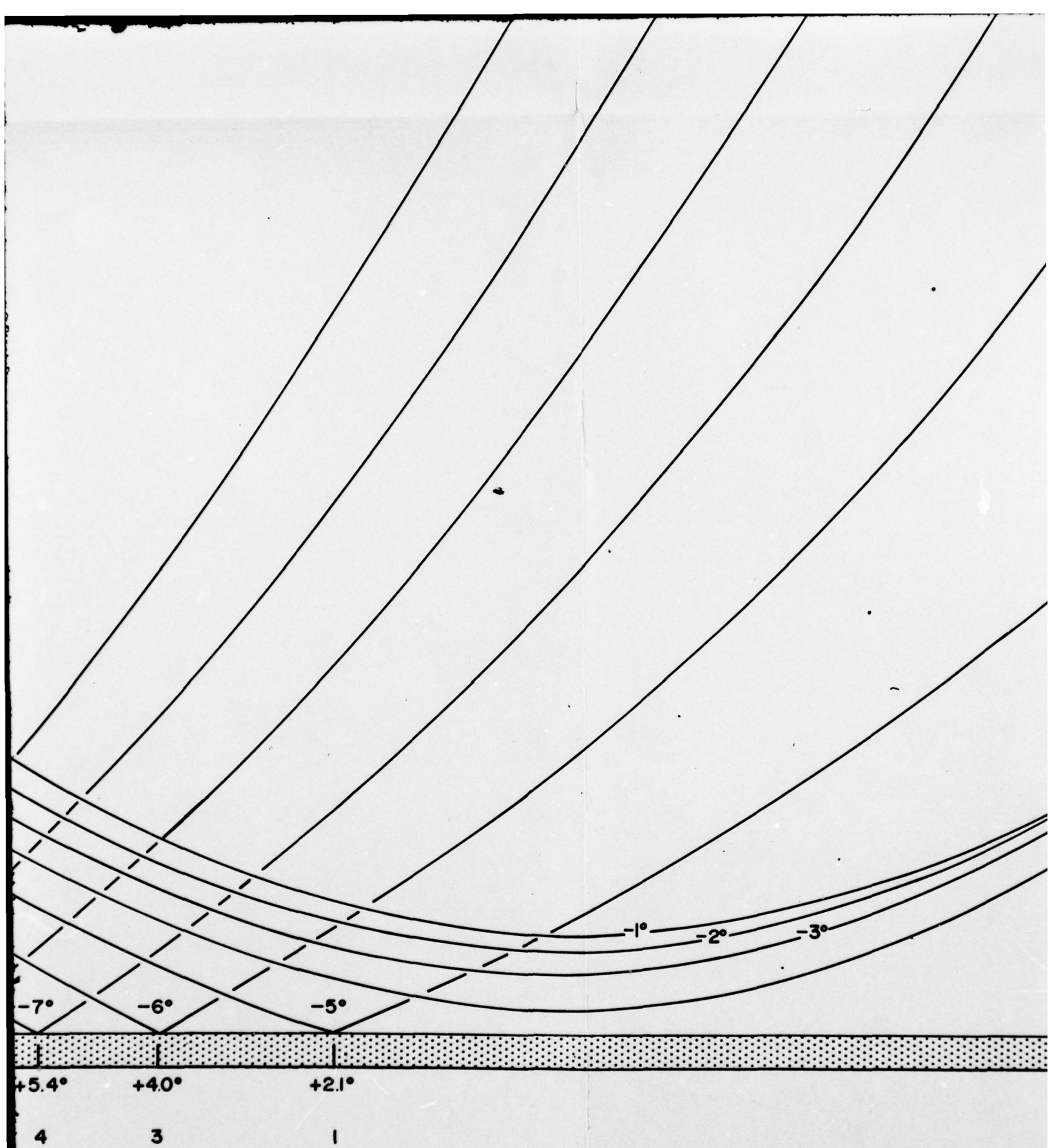


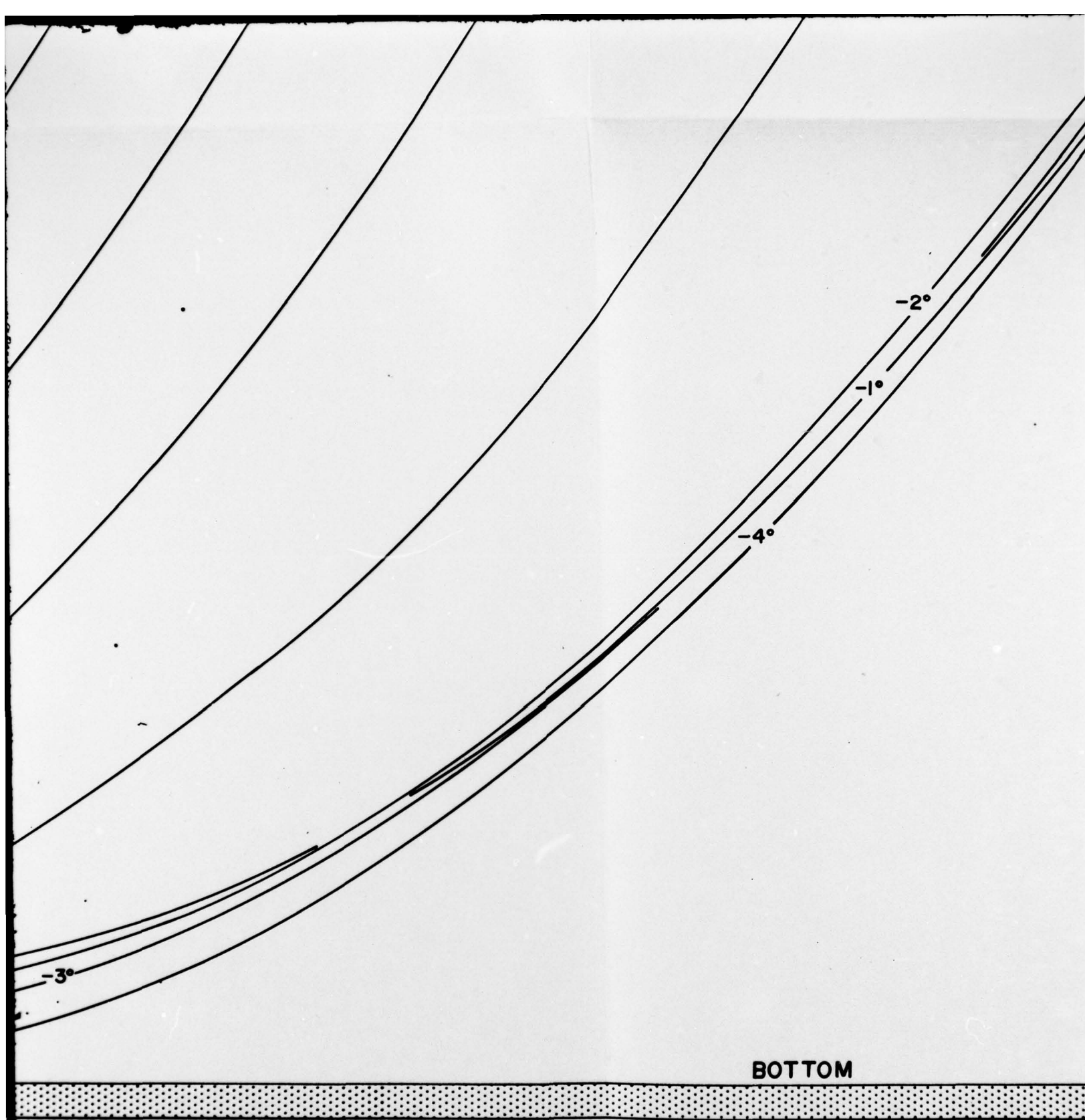
FIGURE 2A RAY DIAGRAM COMPUTED FROM TYPICAL

8



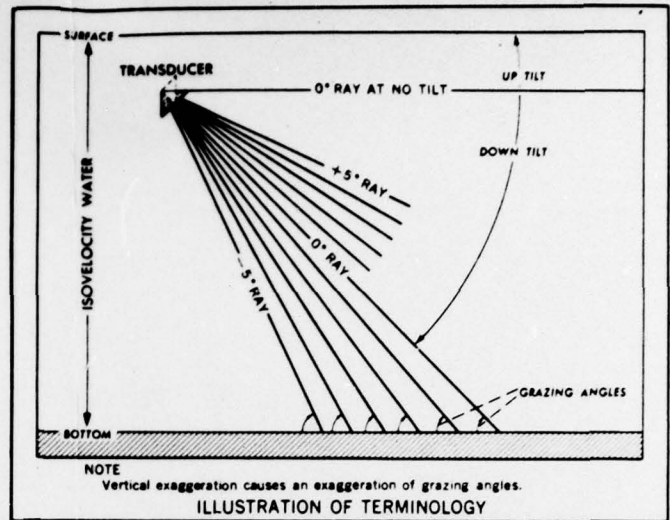
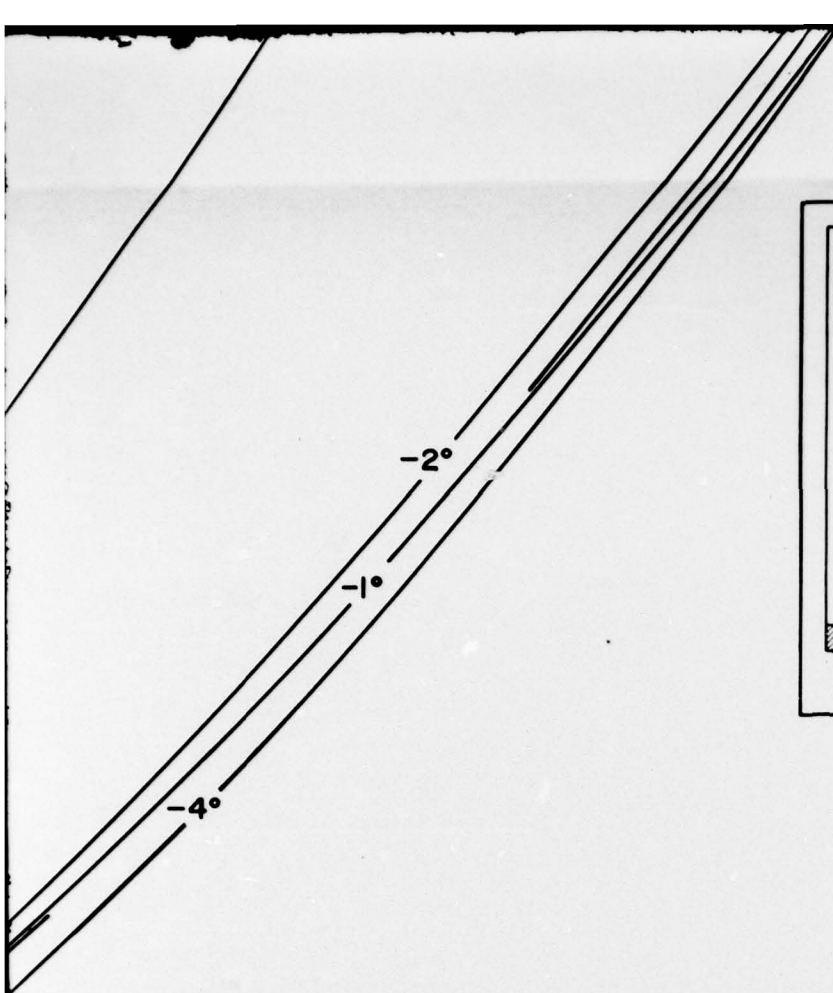
D FROM TYPICAL SOUND SPEED PROFILE (GULF STREAM WATER) FOR CROSS SECTION

q



R) FOR CROSS SECTION A-B SHOWN ON FIGURE 4 FOR AUGUST

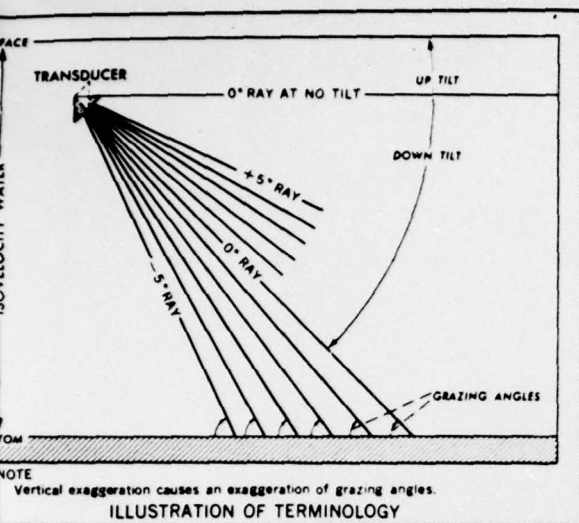




Equipment Tilt	Rays Included
0°	+ 9° to - 9°
-15° (Down)	- 6° to -24°
-30° (Down)	-21° to -39°
-45° (Down)	-36° to -54°
+15° (Up)	+ 6° to +24°

BOTTOM

4 FOR AUGUST



1500

2000

2500

DEPTH (FATHOMS)

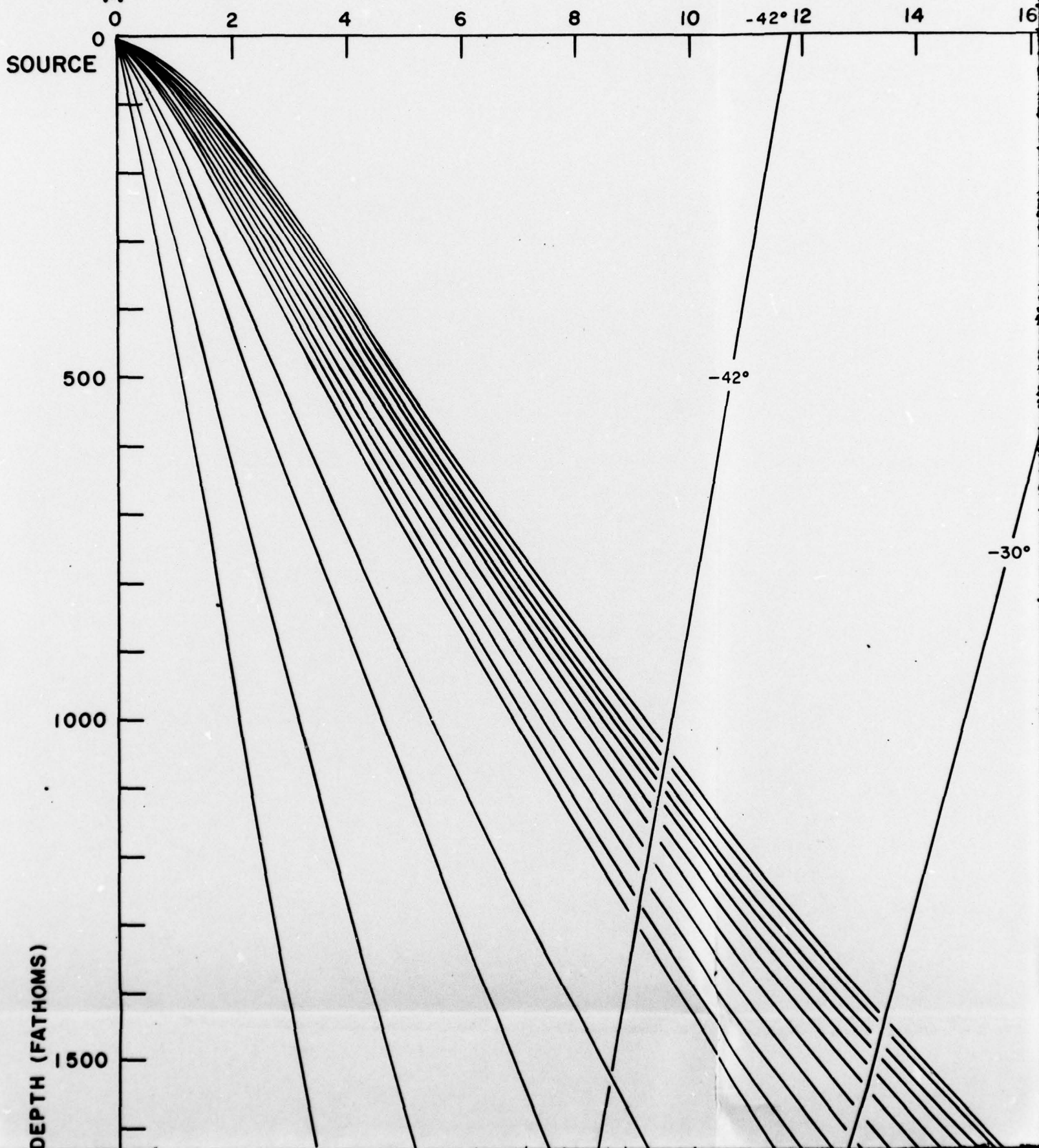
Equipment Tilt	Rays Included
0°	+ 9° to - 9°
-15° (Down)	- 6° to -24°
-30° (Down)	-21° to -39°
-45° (Down)	-36° to -54°
+15° (Up)	+ 6° to +24°

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12

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A





2

14

16

18 -30°

20

22

24

26

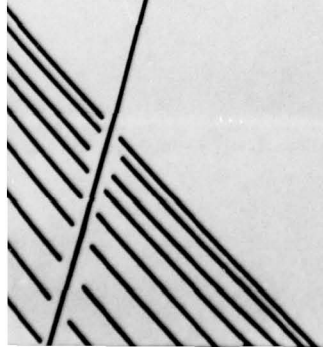
-20° 28

30

-30°

-20°

-15°



3

RANGE (KILOYARDS)

-20° 28 30 32 34 -15° 36 38 40 42 44

SOURCE DEPTH=25 FEET

-15°

-10°

41

42

44

46

-10° 48

50

-9° 52

54

56

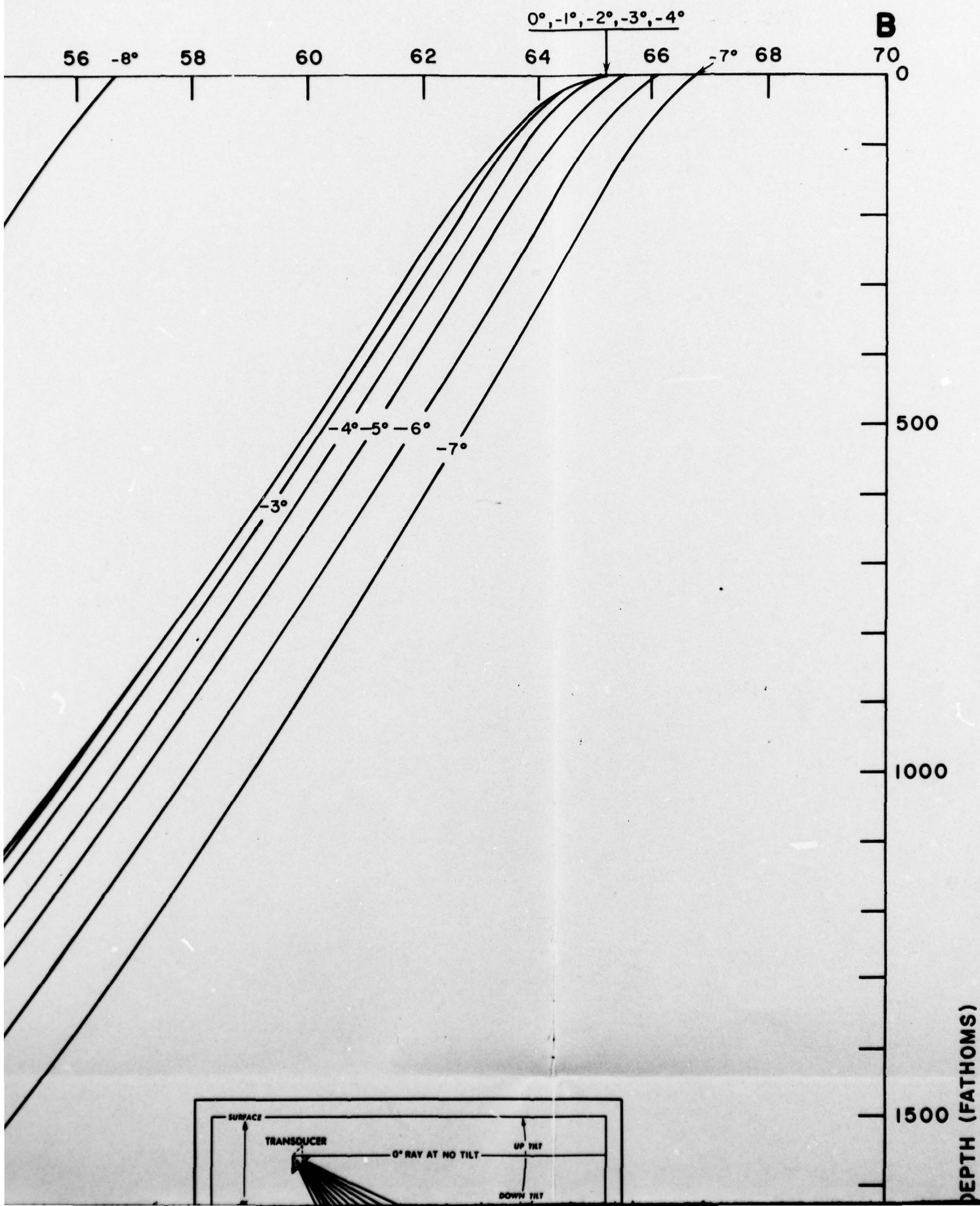
-8°

58





5



DEPTH (FATHOMS)

1500

2000

2500

-42°

-30°

-20°

-15°

-10°

-9°

-30

-42°

-30°

-20°

BOTTOM ANGLE  
2-KC NOMINAL  
BOTTOM LOSS (db)

+41.5°

+29.2°

+18.7°

17

15

11

6

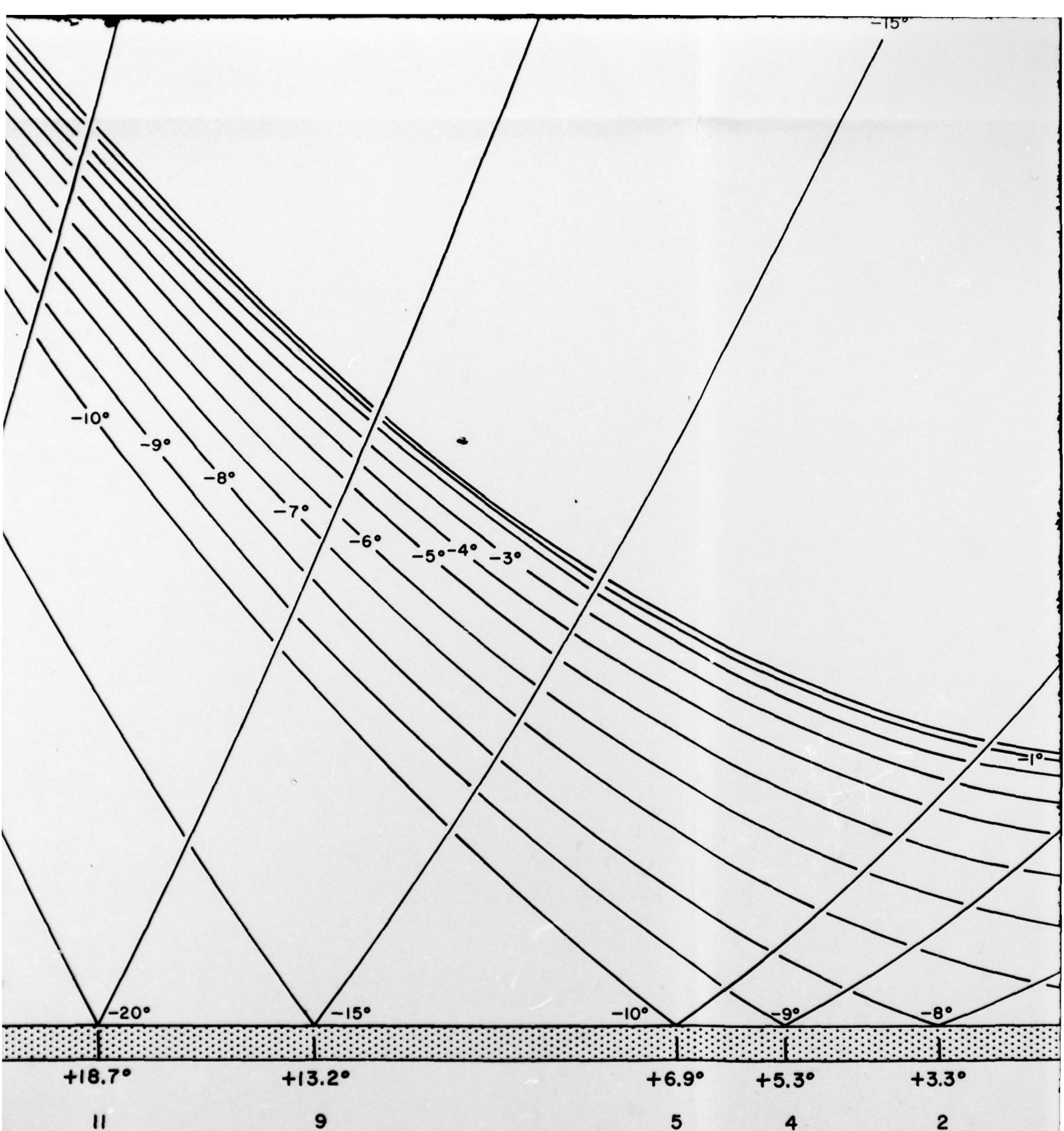
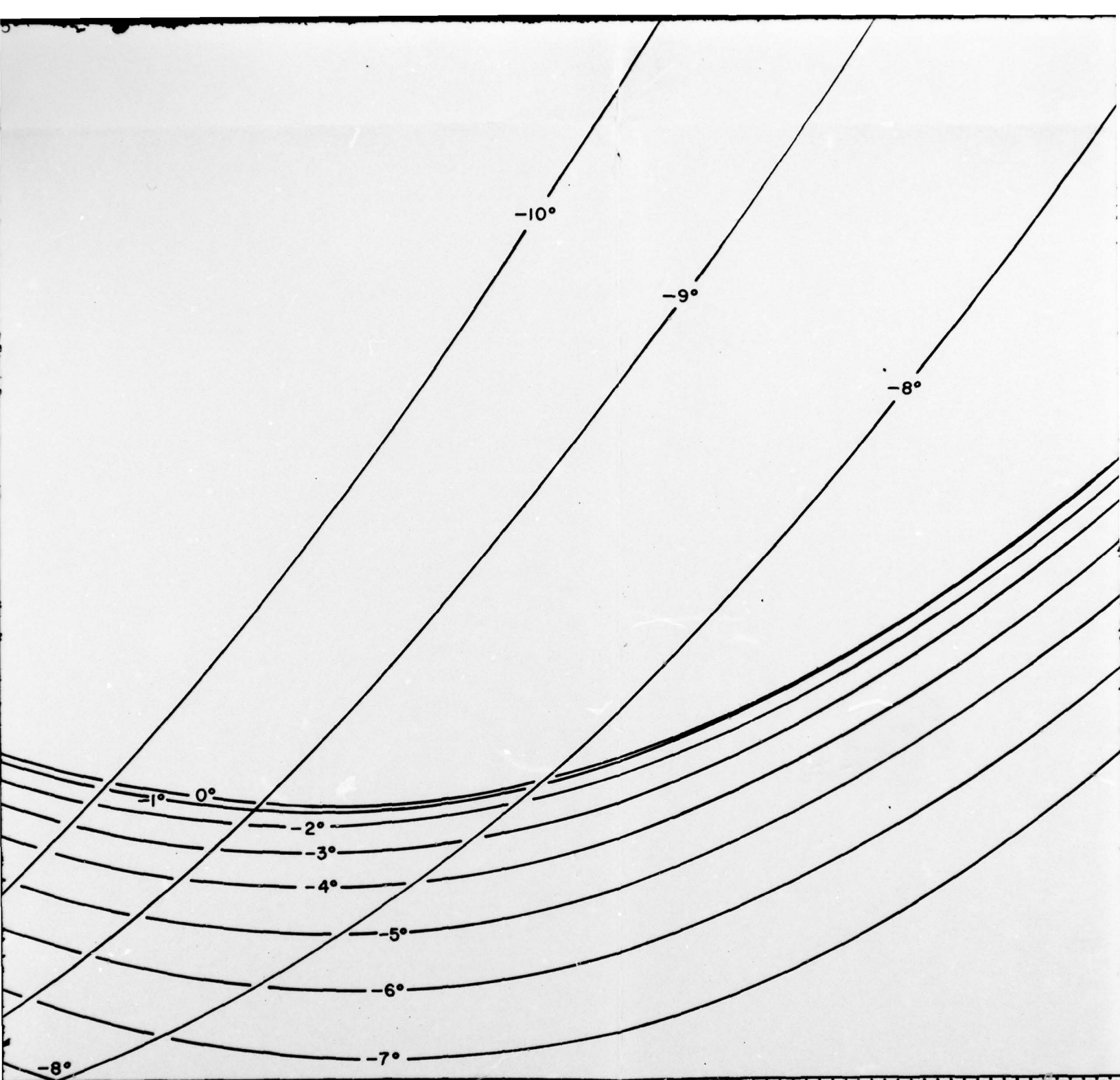


FIGURE 2B RAY DIAGRAM COMPUTED FROM TYPICAL SO





+3.3°

2

A TYPICAL SOUND SPEED PROFILE (SARGASSO SEA WATER) FOR CROSS SECTION A

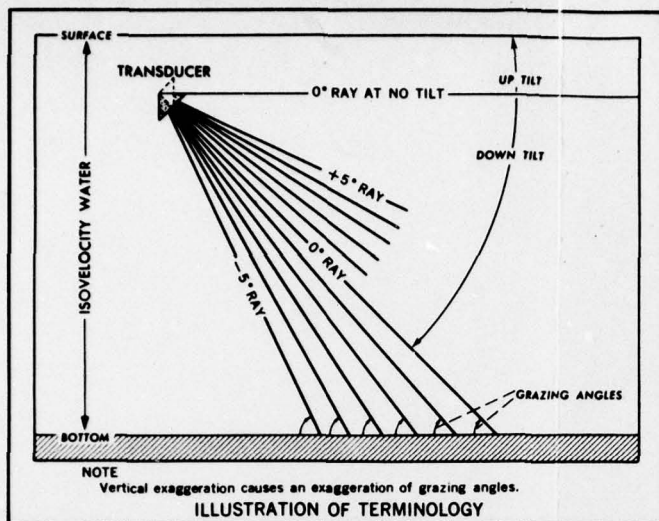


-8°

BOTTOM

FOR CROSS SECTION A-B SHOWN ON FIGURE 4 FOR AUGUST

a



Equipment Tilt	Rays Included
0°	+ 9° to - 9°
-15° (Down)	- 6° to -24°
-30° (Down)	-21° to -39°
-45° (Down)	-36° to -54°
+15° (Up)	+ 6° to +24°

1500  
DEPTH (FATHOMS)

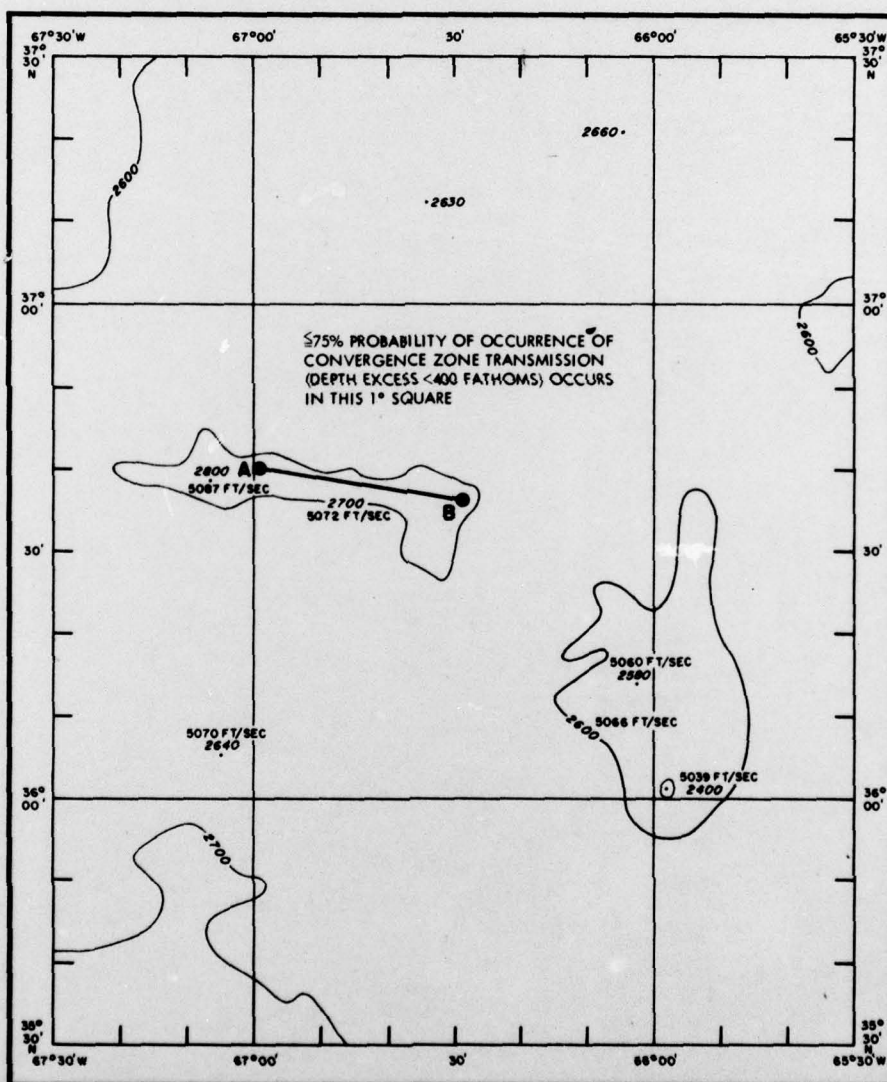
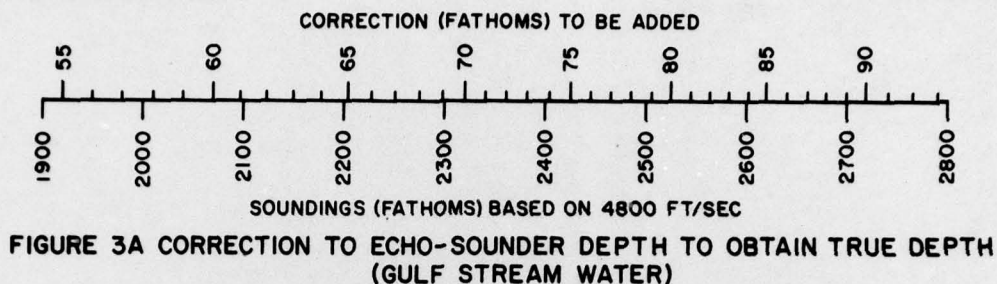
2000

2500

~~CONFIDENTIAL~~



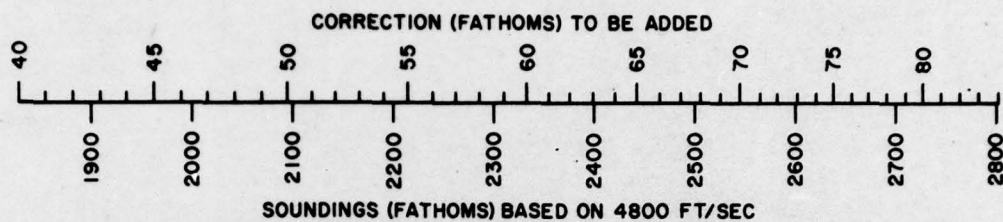
**CONFIDENTIAL**



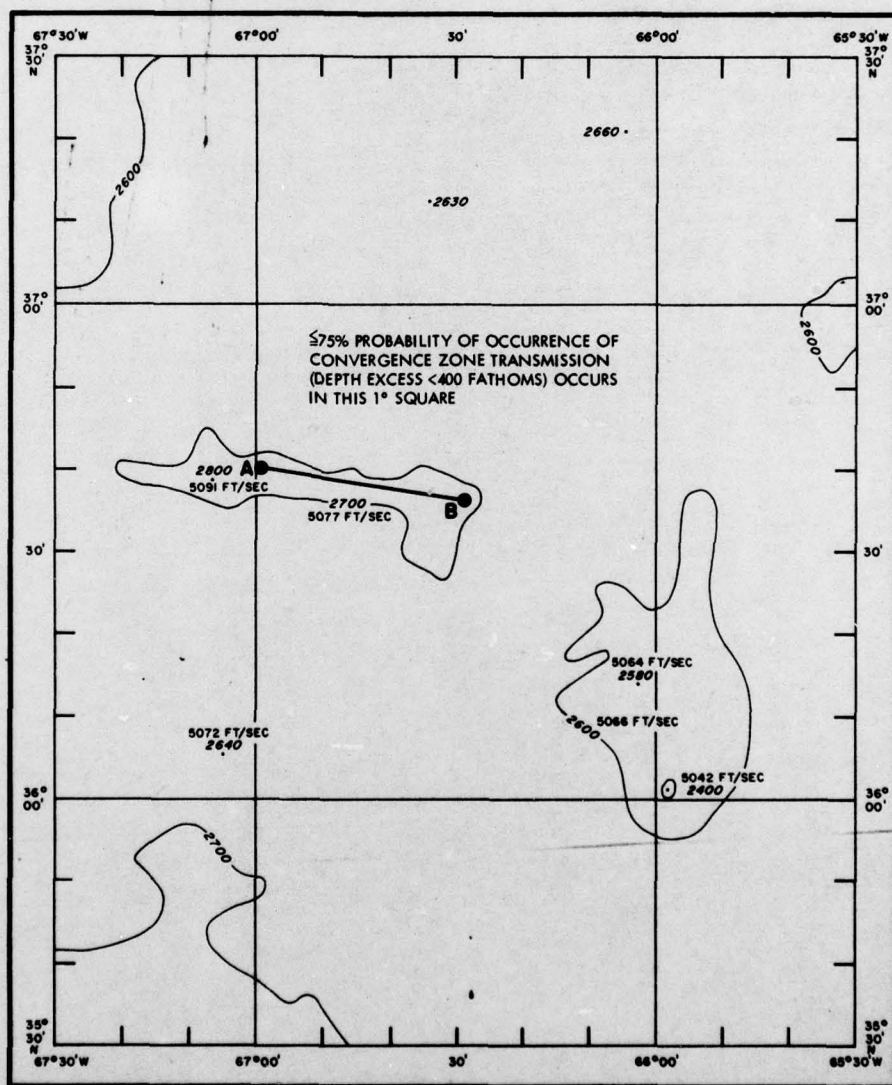
**FIGURE 4A SOUND SPEED (FT/SEC) IN SEA WATER AT THE BOTTOM  
(CORRECTED) AND WATER DEPTH (FATHOMS) UNCORRECTED  
(ECHO-SOUNDER CALIBRATED AT 4800 FT/SEC) GULF  
STREAM WATER**

**CONFIDENTIAL**

**CONFIDENTIAL**



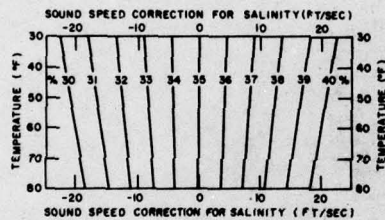
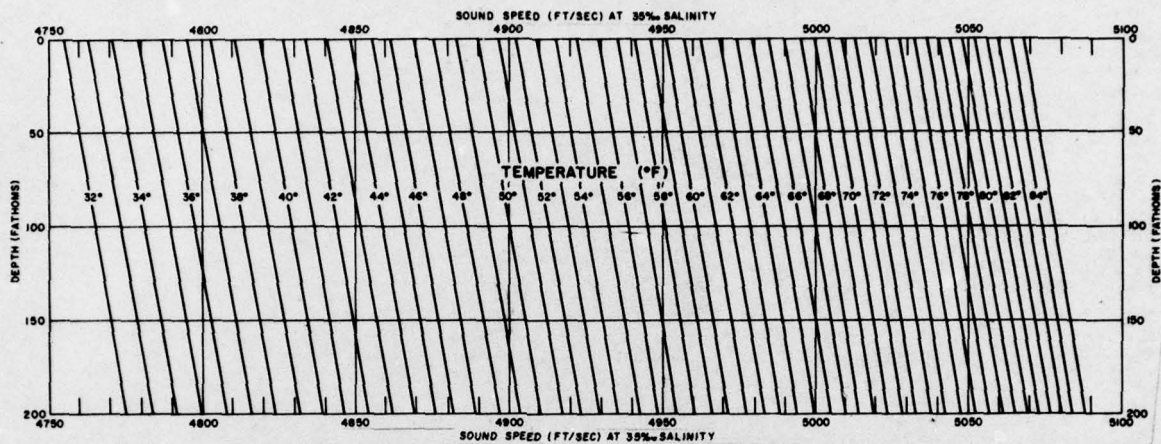
**FIGURE 3B CORRECTION TO ECHO-SOUNDER DEPTH TO OBTAIN TRUE DEPTH  
(SARGASSO SEA WATER)**



**FIGURE 4B SOUND SPEED (FT/SEC) IN SEA WATER AT THE BOTTOM  
(CORRECTED) AND WATER DEPTH (FATHOMS) UNCORRECTED  
(ECHO-SOUNDER CALIBRATED AT 4800 FT/SEC) SARGASSO  
SEA WATER**

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NORMAL SALINITY CORRECTION  
FOR THIS AREA AND SEASON  
IS -5 FT/SEC

FIGURE 5 SOUND SPEED NOMOGRAM

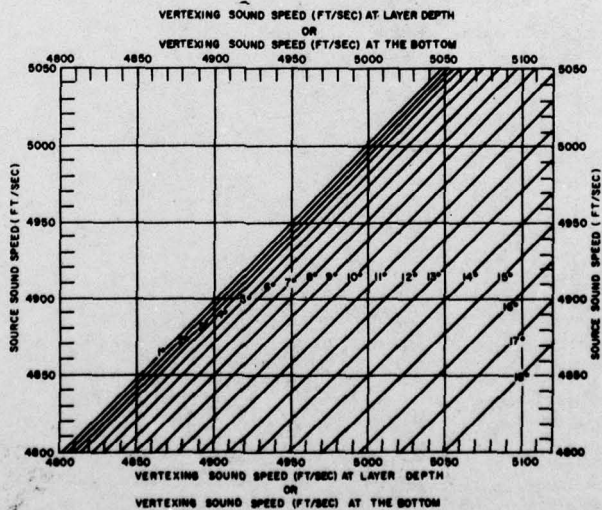


FIGURE 6 INCLINATION ANGLE VS SOURCE SOUND SPEED AND VERTEXING  
SOUND SPEED

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AUG 0-116-63



**CONFIDENTIAL**

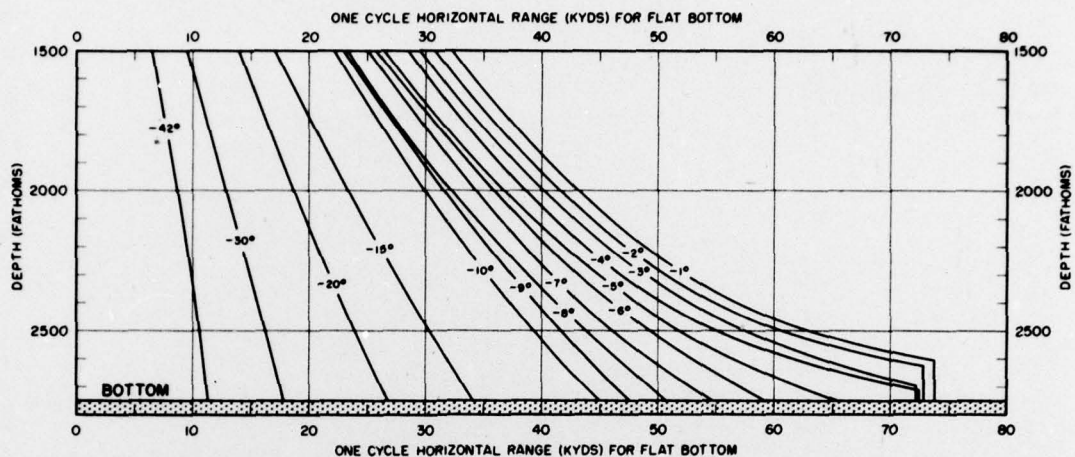


FIGURE 7A MEAN HORIZONTAL RANGE VS INITIAL ANGLE AND WATER DEPTH FOR AUGUST (GULF STREAM WATER)

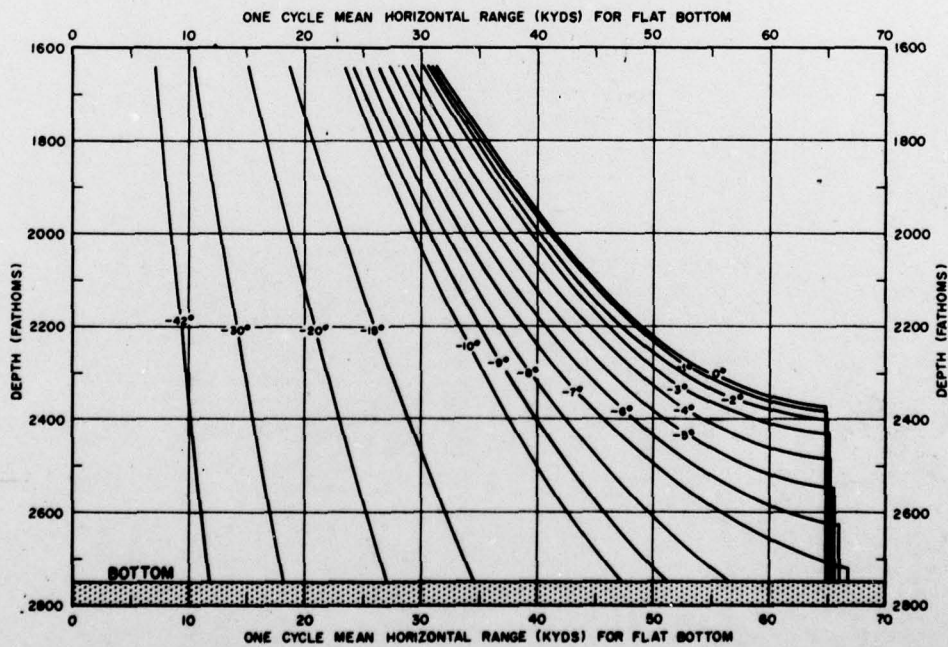


FIGURE 7B MEAN HORIZONTAL RANGE VS INITIAL ANGLE AND WATER DEPTH FOR AUGUST (SARGASSO SEA WATER)

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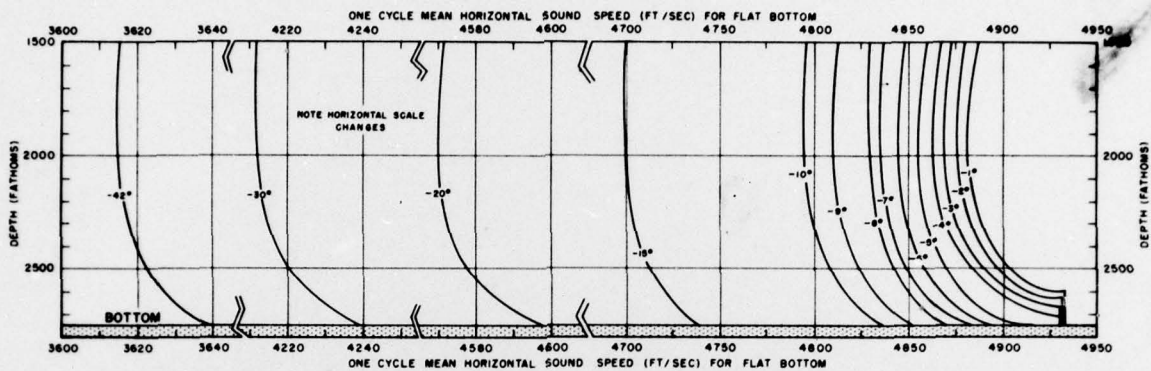


FIGURE 8A MEAN HORIZONTAL SOUND SPEED VS INITIAL ANGLE AND WATER DEPTH FOR AUGUST (GULF STREAM WATER)

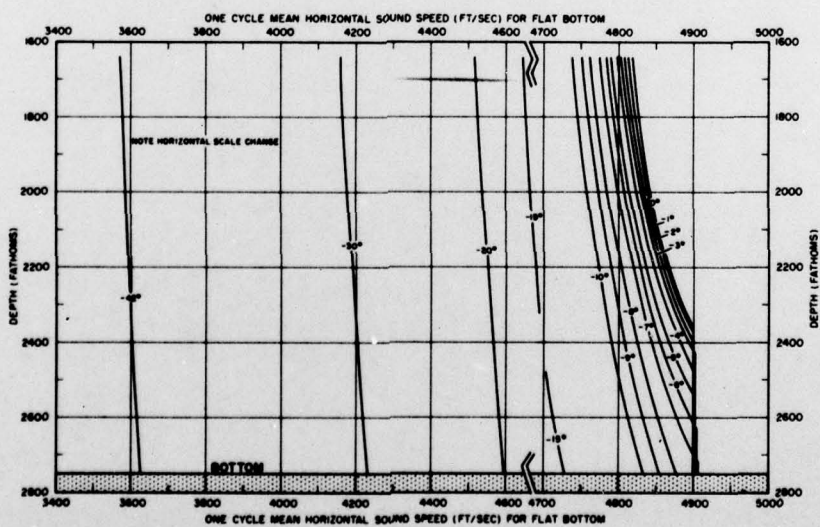


FIGURE 8B MEAN HORIZONTAL SOUND SPEED VS INITIAL ANGLE AND WATER DEPTH FOR AUGUST (SARGASSO SEA WATER)

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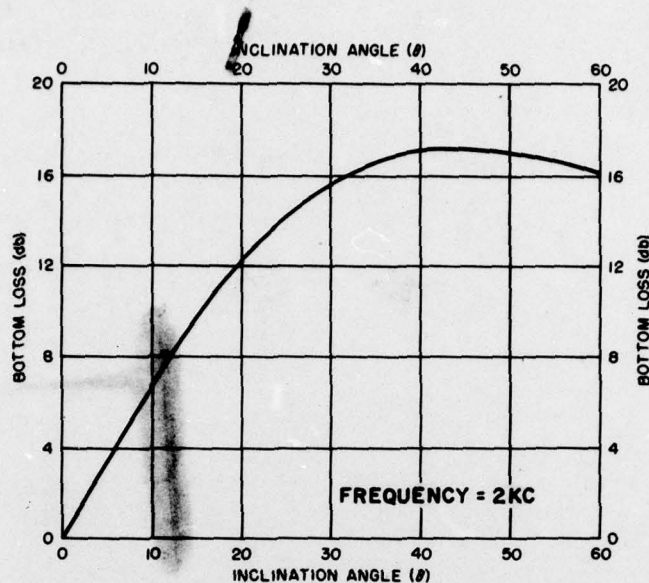


FIGURE 9 NOMINAL BOTTOM LOSS

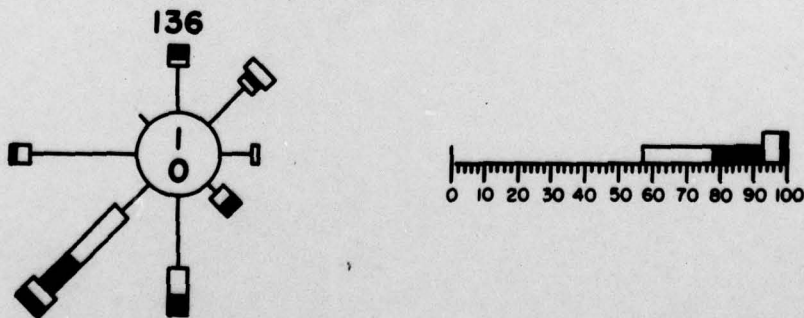
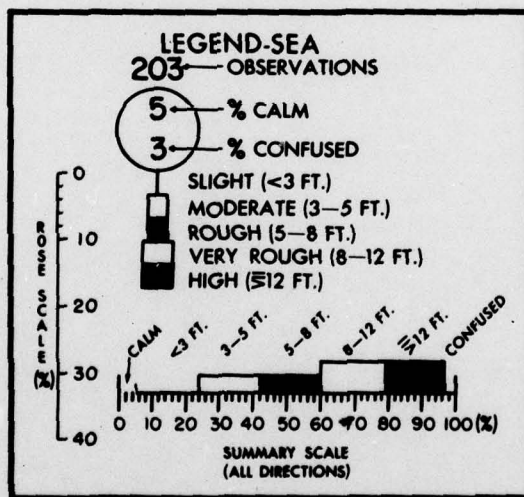


FIGURE 10 SEA STATE ROSE AND HISTOGRAM FOR JULY, AUGUST, AND SEPTEMBER

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